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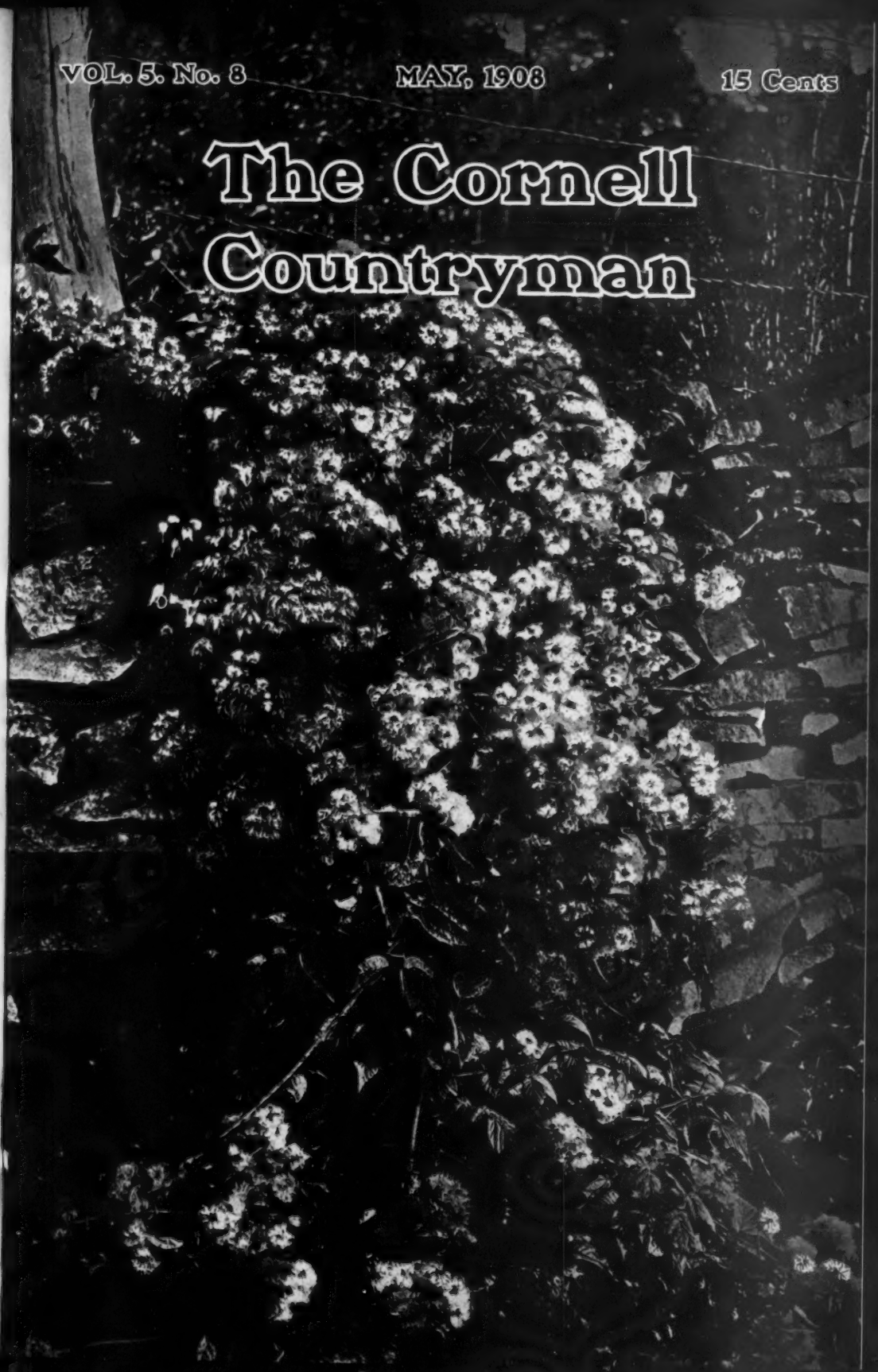
The Cornell Countryman



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AGRICULTURAL INVESTIGATION AND THE ADAMS ACT

By E. W. Allen

Editor of the Experiment Station Record, U. S. Department of Agriculture

THE passage of the Act of Congress of March 16, 1906, known as the Adams Act, has given a great impetus to agricultural investigation in this country. It has placed the United States in the lead of all other countries in fostering the highest grade of agricultural work, and has opened up an opportunity never before presented for the development of agricultural science as a basis for teaching and for practical generalization.

Probably nothing has ever set men to thinking so seriously as to what research in agriculture should be, as distinguished from the usual experiments and trials and collection of data. This has brought out considerable diversity of opinion, and quite marked differences in the conception of the qualities essential to investigation. The fact is, we have fallen into the habit of using the terms "research" and "investigation" quite carelessly, and have often applied them more broadly in reference to experiment station work than they are employed in science generally.

Everyone, practically, agrees that the Adams fund should be consecrated to a high type of investigation. The only real difference of opinion comes in the interpretation of the terms research and investigation as applied to agriculture. One man thinks a trial of the milking machine comes under that head, another the determination of the best system of farming for his locality, another the best system of rotation, another the improving of a cereal or other plant by conventional methods of selection or crossing, another soil fertility, another dry farming, another the determination of the fertilizer needs of different localities by field trials, and still others the finding of ditch linings for canals, means of producing early spring lambs, preservation of fruit juices, digestibility of local crops, and surveys of various kinds, such as botanical, plant disease, soil, range conditions, etc. Others have felt that these investigations should be aimed at more definite and more clearly defined scientific problems, which really lie at the foundation of the large and complex practical questions.

Research in agriculture must evi-

EDITOR'S NOTE: When the idea of a discussion of the Adams Act and its possibilities was being considered, it was suggested that it was almost too technical a subject for the *Countryman* to present. This suggestion, however, was opposed on the grounds that the *Countryman* represents a College of Agriculture, in which science, theory and practice are alike given due importance. If the Adams and Hatch Acts deal primarily with scientific investigation, that investigation is nevertheless in the interests of agriculture and the welfare of the country. And in the belief that such investigation is appreciated alike by the scientist who undertakes it, and the farmer who benefits by it, we present herewith the views of men who have experience, knowledge and insight in regard to the significance of uch movements in agriculture.

dently be governed by the same general principles as that in the pure sciences. Scientific investigation is the same in method whether it relates to agriculture or to physics. It differs only in detail and not in kind. It presumes the same analysis of broad questions into their various scientific aspects, which are to be studied by the scientific method, step by step. We can not study a broad, complicated practical question in its entirety. We must first determine what classes of scientific phenomena the question embraces, and then single out a point which seems to be vital, and concentrate study upon it. The investigation will not solve the whole problem, but it will contribute a definite step in that direction.

One great difficulty with problems in agriculture is their complexity, and the fact that the subject has not been analyzed and classified as the older sciences have. Too often we approach a subject in agriculture from the view point of the art. Soil fertility, for example, a common subject suggested for investigation, is too broad and complicated a topic to be considered as a whole. It is not a suitable unit for investigation any more than the broad subject of health in the human being would be. Specific investigations which aim to determine definite scientific facts will help to clarify both subjects, but no single investigation can hope to settle either. It is only by differentiating such subjects very carefully that we can hope to trace the relations between cause and effect, and understand the application of scientific principles in practice. Until then we shall have only a skeleton of agricultural science permeated with empirical and unexplained information, and we shall not have a systematized basis for instruction comparable with that of the pure sciences.

It is not easy to define research or investigation as distinguished from less fundamental work, or to fix the boundaries where one begins and the other leaves off. As a matter of fact, the aim and attitude of the man in charge determine whether a piece of work shall be merely a demonstration, or have experimental features, or become a thorough-going investigation. The theme itself in no way limits the character of the work. The humblest subject may be a profitable theme for investigation in the hands of the man who has the true spirit of investigation.

It is easier, perhaps, in specific cases to determine what is not research, and to point out the respect in which it falls short. It is not the accumulation of observations or notes or data, or the making of experiments of various kinds, except as these form a part of a definite line of study. The newspaper reporter reports the news items as they occur from day to day. He supplies in part the material from which the historian does his work, but no one thinks of him as a writer of history. The historian considers the facts in their broad relations to the life of the people, weighs these in the light of other events, and writes the history of the times.

Milk sours in some cases; in others, putrefactive changes occur To understand the reason for the phenomena we must know about the various classes of organisms which affect milk, their reciprocal relations to one another, and their behavior under different conditions of temperature, reaction of the milk, etc. Then we can understand the reason for the changes, and are prepared to bring them under control. Until we knew the theory of cheese ripening we were in no position to improve and safeguard the practice.

The usual field experiments with fertilizers gives an empirical answer as to what the plant needs—at least it shows what the soil responded to under the existing conditions. But it does not give a reason for the result, or any measure of the influences that are operative, and, as a matter of fact, contributes little if anything to a scientific understanding of either plant nutrition or soil fertility. Research does not seek to find merely what combination of fertilizers, or what

method of propagation and culture, or even what combination of crops will keep up the productivity of the land to a profitable point; the combined results of many investigations will enable these questions to be answered. But it attempts rather to find out why certain results follow certain methods of treatment, what that treatment actually brings about in the soil, and how it influences the physiological activities of the plant so that we get an abundant yield or a crop with certain qualities or characteristics. Such knowledge will enable the foundations of agriculture to be laid in science, and will supply a basis for teaching the student the reason for things instead of the bare facts.

It is essential to distinguish between the search for knowledge and the application of well established facts. The development of a method of chemical analysis on the basis of the reactions of different compounds may be regarded as a piece of research, but the application of this method in routine analysis in the laboratory is only the intelligent and skillful use of what has been learned and formulated. The development of a virus or vaccine as a preventive of disease calls for thorough-going investigation, but its employment after the method has been developed, whether by the veterinarian or the intelligent farmer, is no more research than is the every-day practice of the physician. The case seems to be similar in the breeding of plants or animals where the aim is merely to get something better. The element of investigation seems to be absent, or at most very incidental. With such knowledge of the principles as has been gained, and following methods of procedure which have been developed and tested, an attempt is made to secure or accentuate certain traits or characteristics in the plant. Here again the aim largely determines the kind of work. If the man in charge is satisfied with merely getting a better strain or variety, or determining an empirical fact without going into the reason and limitations, his work will stop at that point, and while it may have a good deal of practical value it will not teach us how better to secure such results, or the laws that lie back of the phenomena.

The immediate needs of the farmer can not be the first consideration in planning investigations, as they often are in practical trials and experiments. But investigation is none the less practical, and the knowledge gained will no less surely be of value to the farmer when it is applied in the working out of methods or the interpretation of practice. It means a little more patience in the interest of accuracy and reliability. Nowhere is a little knowledge more dangerous than in agriculture or more likely to lead to misapplication and error.

Agricultural experimentation is continually leading the thoughtful experimenter to inquire as to the reason of things as he interprets and attempts to apply his results. To him, as to the teacher, the serious gaps which now exist in our science of agriculture are continually embarrassing. The practical man is not necessarily interested in the fundamental basis of generalizations as to methods, but even he is becoming skeptical of dogmatic rules, and is taking more thought as to the reason for the practice which is recommended to him. He is beginning to understand better the nature and the importance of research in agriculture.

EXPERIMENT AND RESEARCH

By L. H. Bailey

Dean of the College of Agriculture

THE Hatch Act is the expression of a people wanting direct, quick, timely information, to aid in the daily business of farming. This is well set forth in the declaration of purposes: "That it shall be the object and duty of said experiment station to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soil and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective states or territories."

Practical and directly applicable work was the result of this enactment. The work has been largely along the lines of observation, testing, compiling, disseminating. Its purpose has been to meet the pressing problems presented everywhere by the man who is meeting difficulties.

In due time, however, persons began to want knowledge independently of present difficulties: they wanted to know the real reasons why. In fact, the official horticulturist himself has felt the necessity of real understanding, for he cannot forever answer questions from the surface indications. The Adams Act is the expression of a people wanting final reasons and real facts. This is well set forth in the declaration of purposes; "To be applied only to paying the necessary expenses of conducting original researches or experiments."

As I conceive it, research is the attack of fundamental or underlying questions, founded on long and patient personal preparation, endeavoring to reach their ultimate causes and reasons, the results to constitute a real contribution to human knowledge, of wide or even universal application, and standing good in years to come as well as now. It is a contribution to the substratum of truth, on which rational practice may eventually solidly rest. As it may be non-timely, so is it unhasting. It is not observation; it is not testing; it is not demonstration; it is not playing with a thing to see what it will do; it is not recording phenomena nor reactions or other data; it is not the mere elucidation of practices; it is not description; it is not the effort to make things prove; it is not mere experimenting,—to experiment is to try. This last phrase suggests that I call attention to the fact that the Hatch Act establishes experiment stations; I have often wondered what would have been the result if it had established research stations.

Now, research is not so much a matter of the subject, as of the intention, the point of view, the method of work. That is to say, whether any piece of work is experimenting or research is determined by the man. Every subject or question has its underlying reasons how and why. This being true, there is no reason why the agriculturist should not engage in research as well as anybody else.

If every subject may develop both an experiment intention and a research intention, it will not be neces-

sary to make a list of subjects that are proper under the Adams Fund, but only to illustrate still further what I mean by these distinctions. To make tests of spraying mixtures and machines is ordinarily not research: to endeavor to study the real chemistry of spray mixtures, their physiological action on the insect or fungus, their effect on the tree or the soil, their relation to climatic changes, may be research, if the subject is approached with the determination to bring to bear patiently the best knowledge and methods and to discover laws and principles. The two kinds of work may progress at the same time under the same hand, but the likelihood, judging from experience, is that they will not. To endeavor merely to produce a new variety of plant by crossing and sowing the seeds may or may not be research, with the probability that it will not be: the effort to determine the laws of variation, the physiological processes of heredity, the numerical results of hybridization, and the like, ought to be research. Variety-testing is ordinarily not research; in fact, it is a question whether it is ordinarily even good experimenting: but the variation of varieties, their relation to soil and climate, the correlation of behavior under different conditions and in different places, ought to be research of the best kind. Similar remarks may be extended to all our customary subjects.

A man may experiment with many things, but he can undertake research with only a few things. The research man is, of necessity, a rather close specialist. He seeks permanent rather than temporary results. He is likely to be an obscure man, as the world goes, avoiding the lime light. He cannot delegate very much of his work. He stands by it and has personal knowledge of all the processes and events.

The greatest handicap to research in the American experiment station is over-organization. It is our wish to develop a large department, to have many assistants, to attack many subjects, to attend many meetings. All this is laudable, and, to avoid dispute, we will assume that it is necessary; yet even then it is possible to do something to lesson the burden of mere executive effort. There is crying need to lighten this burden, for we are spoiling our good specialists by making business men of them. I contend that it is wise, both for good teaching and for real efficiency in experiment and research that a specialist have only such executive duties as pertain to his specialty. As rapidly as possible, I would break up agronomy, horticulture, and all other customary arbitrary departments into their units, letting each man have the headship of his particular unit and of no other. In other words, I would let each man attend to his own business. Agronomy is not a unit; nor is horticulture; nor is animal husbandry; nor is rural engineering. It might seem that this small dividing of work would tend to loss of solidarity and unity in the institutions as a whole, even admitting the wisdom of allowing each man to devote himself to that subject for which he is best fitted; but if diffuseness and incoherence result, it is clearly the lack of a strong centralizing agency in the directorate of the institution itself. The work of several men in a department of horticulture or agronomy can be solidified by one of three methods: (1) by a dictator in charge of the entire department; (2) by mutual conference, with one of the group acting as chairman; (3) by mutual conference with the director of the college or station of which the department is a part. The first plan is inadmissible and unproductive of good results with trained men; either of the latter is advisable, a combination of the two producing the best results.

The organization that I recommend should have a powerful influence in concentrating the work of the various men. I suspect that it should produce particularly useful results in horticulture, in which the men are too general in their work and cover too much ground.

With the multiplying of demands

on the colleges and experiment stations, the time has come when we must make it possible for at least a few men of proper qualifications to devote all their energies for a life time to research, without the necessity of attending institutes, or of teaching undergraduates, or of giving advice all over the commonwealth, or of running a business organization. It is time that a few men be allowed to begin to stay at home. I distinguish four types of agricultural college or experiment station work :

Teaching of an academic character.

Teaching of an extension character.

Experimenting of a research character.

Experimenting of an extension character.

Most of us must be experiment-teachers and spreaders of propaganda ; a very few may be investigators. The former has been the more needed in the past few years ; they always will be of equal importance with the investigator, and they represent an equally high type of effort. My argument is that we now need to distinguish and to classify our men.

The Hatch Act came before its time if real research only were intended ; or, to put it in another way, that great Act has prepared the way for genuine investigation. This investigation will not be founded on the Adams Act alone, but other funds in increasing amounts will be devoted to these ends. The funds will be forthcoming as the demands begin to press. Funds rise to meet the man. I am sure that agriculture will develop a research spirit as fundamental as that which underlies any other subject whatsoever.

RESEARCH UNDER THE ADAMS ACT

By H. J. Webber

Professor of the Department of Experimental Plant Biology

WHAT is scientific research or investigation in agriculture? This is a question which since the passage of the Adams Act has caused much comment and discussion in agricultural circles. At first thought it would seem an easy matter to determine what work would be considered research and what would not. But the more carefully the matter is considered, the more clearly we can recognize the difficulties of determining where the limit should be drawn between scientific research and what is not scientific research. One of the first steps in clearing up any confusion of ideas regarding debatable investigations is a clear recognition of the difference between science and art, or between discovery and application or demonstration. Science in the sense in which the term is used when we speak of the science of agriculture, refers to the underlying fundamental principles of agriculture which have been discovered as a result of investigation and exact observation, and then carefully correlated and systematized. These facts, it is true, may be largely or wholly classifiable under the various primary sciences such as, chemistry, physics, botany, zoology, geology, etc., but in so far as they refer to agriculture when collected and systematized, they form what we may properly term agricultural science, just as the systematized knowledge relating to the treatment of human diseases is termed medical science. The writer would thus maintain that there is a science of agriculture in the true sense, although agriculture as practiced should be considered an art. Art, according to the Standard Dictionary, is "The skillful and systematic arrangement or adaptation of means for the attainment of some desired end. The practical application of knowledge or natural ability." The knowledge which is used and applied in the art may be science but the knowledge itself is not art and no

more is the art science in what we conceive to be the properly restricted sense.

We find too often that certain so-called scientific investigators are apparently using the fourth definition of science as given by the Standard Dictionary,—"Exceptional skill acquired by intelligent practice, as the science of the pugilist." Scientific research is the systematic and intelligent prosecution of observation and experimentation for the purpose of discovering new facts and laws. After a law or principle has been discovered and established its application and demonstration could not be considered research.

The work of our Agricultural Experiment Stations for a considerable period after their organization consisted largely in compiling the knowledge of agriculture which already existed. The hosts of discovered facts published and unpublished were in chaotic condition, scattered here and there in unavailable places. These were gradually accumulated, systematized and published in bulletins. Much of the science on which agricultural practice was based was not understood, the methods in use having been established empirically. These methods required to be tested and the underlying scientific factors discovered. A considerable portion of the work of the Experiment Stations up to the present time has been expended in demonstrating the truth or fallacy of such methods. Some of this work has been conducted as demonstrations primarily and could not be considered scientific investigations. Much of the experimentation, however, has been carefully arranged and planned to establish the scientific principles on which the practice was based and has added much to our knowledge of the science of agriculture.

The art of agriculture asks only, how? the science questions, why? These questions are almost fundamental the writer conceives, in determining whether a piece of work may or may not be considered scientific research. The farmer or artisan desires only to know how to accomplish a certain result while the scientist desires not only to know how a certain result is accomplished but why the forces brought to bear produce this result. This difference in view-point as the writer conceives it, may be made clearer by some examples.

Two experimenters knowing that inbreeding is used in the fixation of hybrids start experiments. One attempts to answer the question, "How can we render hybrids stable?" and makes many experiments in inbreeding and produces a number of fixed types. He has used the art of inbreeding and has demonstrated its efficiency in breeding hybrids to a state of fixity. He has, however, added nothing to the science. The other experimenter questions, "Why does inbreeding lead to fixity in hybrids?" He studies the question from all sides. He perceives that the great variation in hybrids is due to the commingling of widely divergent types. By experiment, he proves that hybridization in closely related types produces less variation than is produced in very divergent types. He postulates the hypothesis, therefore, by induction that the commingling of germ plasms with slight hereditary differences causes less variation than the commingling of germ plasms with greatly different hereditary tendencies. From this he deduces that to produce a fixed strain of a hybrid plant it should be inbred with its own pollen, which should contain the same hereditary tendencies, or with pollen from as nearly similar a hybrid in all characters as can be found, as this should transmit similar hereditary tendencies. In his experiments he would thus (1) inbreed hybrids with their own pollen; (2) inbreed hybrids with pollen from selected hybrids having similar characters, and (3) inbreed hybrids with pollen from other hybrids having widely distinct characters. When his work was finished he would not only have demonstrated how to fix hybrid races, but he would have discovered why this policy leads to fixity of type and have enunciated a scientific principle.

An experimenter may see the desirability of producing varieties of some plant resistant to a certain disease and discovering plants which show some degree of resistance, he carefully selects these, using the breeder's art, and finally produces varieties which are resistant to the disease and of very great value practically. Has he been conducting a scientific experiment? There is no question as to the value of such work; in several cases of this nature, now classical in the annals of agricultural literature, results of far-reaching importance have been secured. The methods, however, were empirical. The only fact demonstrated was that resistance to a certain disease of a certain plant constituted a character which was inherited. Had this investigation been extended and the cause of the resistance determined it would have been a scientific research of the very highest class. Such results might throw light on the general cause of disease resistance and furnish a method of producing resistance in the case of other diseases. True, the determination of the cause of resistance to plant diseases is an obscure and difficult problem toward the solution of which we as yet have nothing but vague suggestions and the experimenter is justified in taking such results as he can secure.

In the field of breeding in general, we may say that the experimenter who is breeding plants as such experiments are ordinarily conducted is not carrying on a scientific investigation. With broad knowledge of cultural conditions and crop demands, he studies the situation critically and determines that varieties of a certain type are demanded for the advancement of agriculture. His experiments may be planned and executed with consummate skill and he may achieve the end desired and produce a new corn, cotton or apple of the greatest value, yet in general we must acknowledge that he has not conducted a scientific investigation, but has simply demonstrated what wonderful improvements may be produced by the use of the breeder's art. If, in producing the improvement, instead of selecting only certain desirable variations as they accidentally occur, the experimenter had studied the causes and classification of the variations and the hereditary strength of the different types of variation, the investigation might have been made a true scientific research.

The worker in an Experiment Station even of the highest grade feels the necessity of soon getting results that can be published. This demand is a part of our national character, we want something to be doing and want proof that something is being accomplished. The station management may be broad and liberal and no actual demand may be made for quick results, yet the worker feels keenly the competition and knows that nothing succeeds like success. He realizes that the recognition by the people of his State of the value of his work is the strongest fortification in his position which he could have. The temptation to take up work of the nature that will bring this recognition, is thus well nigh insurmountable. The great temptation is to take up problems of superficial nature which will give quick and sure returns, rather than to select the slow, tedious and doubtful problems which are of more fundamental scientific nature and more difficult of solution. To meet the requirement of the Adams Act will necessitate careful, constant and wise supervision of the problems and work for many years.

Again, many of our experimenters who are expected to conduct Adams Act investigations are poorly trained and have not the critical knowledge necessary to conduct such investigations. Time will remedy this defect but much of the first work will necessarily be of doubtful quality. Again, many investigators having the necessary training and experience are handicapped for the necessary facilities to attack the problems they desire to solve. Certain it is, that even in the largest and best organized Stations with sympathetic and appreciative management the carrying out of ex-

tensive scientific experiments is difficult, and the difficulties must be many fold greater in the newer and smaller Stations, where in many places the management is none too sympathetic toward the scientific research problems. It is hard to conceive the attitude of such men when practically all of the great discoveries of agriculture have come from the conduction of pure scientific experiments. No well trained, thinking man can fail to appreciate this fact. No problems could be more scientific than those connected with soil bacteria and their relations to soil fertility and toxicity and yet, probably no investigations relating to soils promise knowledge of more practical utility. No investigations could be more scientific than those leading to the discovery and extension of Mendel's principles of heredity, and yet we may safely say that no discovery of the last two decades is of such great importance to the practical breeder of plants and animals.

Another matter of the greatest importance in connection with the administration of the Adams Act is the question of salaries which shall be paid to highly trained men. We have not advanced sufficiently in our ideas generally to be willing to pay for extra training. We recognize the value of post graduate training and always desire to get Ph.D.'s when possible, but we expect such men to begin at the same salaries as men just out of college with no experience. Is it any wonder that so few of the young men in our Experiment Stations have the Doctor's degree? There is now no incentive to take extra work. Students who take Doctorates now do so mainly at the sacrifice of salary and position. They are only led to take advanced work by their ambition to develop themselves so that they may attain high standards in their work. If we wish well trained men who can do advanced work we must pay for them.

WHAT IS RESEARCH?*

By Dr. Thomas F. Hunt

Dean of the Pennsylvania State College

WHEN Smithson endowed the Institution which now bears his name he declared its purpose to be "the increase and diffusion of knowledge." This wording is so simple, so clear, and so direct as to leave nothing further to be desired, yet the significance of these six words may be better understood if it is stated what the Smithsonian Institution was not intended to do. It was not to make laws nor to enforce them nor to administer justice, the three great functions of government in the days of Henry Smithson.

It was not to be an industrial enterprise, although knowledge gained might and would be expected to promote industries. As is well known one of the successors of Joseph Henry devoted much time to the construction of a flying machine. It was not to be a church, although it is hoped and believed that the increase in knowledge will influence the moral and spiritual welfare of the people. Smithson, in founding his institution, was not a patron of art. * * * *

It will be noted that the Smithsonian Institution has two functions: (1) Increase of knowledge or research; (2) diffusion of knowledge or education. When it has discharged these functions it has discharged the purpose for which it was founded. When it discharges any other functions it exceeds the purposes of its creation. Its efforts may result in better laws, greater justice, more economical productions, higher ideals, nobler efforts and a greater sense of the beautiful; but it is no part of its duty and it cannot directly promote

*From an address delivered before the Society for the Promotion of Agricultural Science.

these ends without going beyond the purpose for which it was founded.

The Smithsonian Institution has been mentioned because it was the opening wedge of research in this country under governmental control. It should now be noted how much more direct and obvious were the six words of Smithson than is the phraseology of the law making power which enacted the Hatch and Adams Acts. The Hatch Act reads:

"That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and application of agricultural science" and later:

"That it shall be the object and duty of said experiment station to conduct original researches or verify experiments."

Then follows a list of subjects on which it is proper "to conduct original researches or verify experiments." The Adams Act "for the further endowment and support of agricultural experiment stations" provides that the money so appropriated is "to be applied only to paying the necessary expenses of conducting original researches or experiments." If there is in the mass of words quoted, any direction to do anything but increase certain kinds of knowledge by any form or effort calculated to increase such knowledge, it takes some one with a more acute perception than that possessed by the writer to comprehend it.

But what are experiment stations to do about the diffusion of knowledge? Section 4, of the Hatch Act says: "That bulletins and reports of progress shall be published;" and Section 5, "That for the purpose of paying the necessary expenses of conducting investigations and experiments and printing and distributing the results" certain sums of money are hereby appropriated. The Adams Act is silent upon this subject, although it states that the sums appropriated are "for the further endowment and support of agricultural experiment stations." From these quotations it is evident that the clear intent of the Hatch Act was not to supply money for the diffusion of agricultural knowledge in general but it was to be restricted to the publication of such increase of knowledge of the prescribed kind which each Experiment Station might in the course of its "researches, investigations or experiments" discover, and that if it was not so fortunate as to increased knowledge four times a year, it might report progress. * * * *

What, then, is the function of the Experiment Stations? It is to increase knowledge along the lines prescribed by the law and publish the results. Is that all that should be done to promote agriculture? By no means. But it is all that the Federal Funds are appropriated for according to the terms of the Hatch and Adams Acts. There is in every state a land grant college receiving funds from the Morrill Acts of 1862 and 1890. These institutions also in many instances receive state aid. It is without doubt the duty of these institutions to educate resident and non-resident students in agriculture, to increase agricultural knowledge among its citizens and develop in every way possible the agricultural resources of the state. Probably at all times the greater part of the activities of the agricultural college of which the experiment station is a part should be devoted to education, to the diffusion of knowledge, to the protection of the farmer against fraud, in creating higher ideals and inspiring better endeavors. Fundamental to these forms of activity is the experiment station which creates the knowledge by means of which this propaganda can be conducted.

There is an opinion current that there are two rather distinct lines of effort possible under the Hatch and Adams Acts; namely, practical experiments and original research. This doctrine has prevailed many years and has frequently been discussed. It is one that the writer has for years sought to understand but without suc-

cess. Further, he belives it not only incorrect but pernicious: calculated on the one hand to permit forms of activity which should not be undertaken by experiment station funds, and on the other hand to promote certain forms of effort not of prime importance or to give these efforts an importance entirely out of proportion to their value.

What is research? It is any form of effort by which knowledge is increased. The Hatch and the Adams Acts state in substance that the function of the experiment station is to increase knowledge along certain lines summarized in both Acts as "bearing directly on the agricultural industry of the United States." If it is a form of effort calculated to increase knowledge "bearing directly on the agricultural industry of the United States," it is research and is legal; if it is not a form of effort calculated to increase knowledge it is not research in any sense and is not legal.

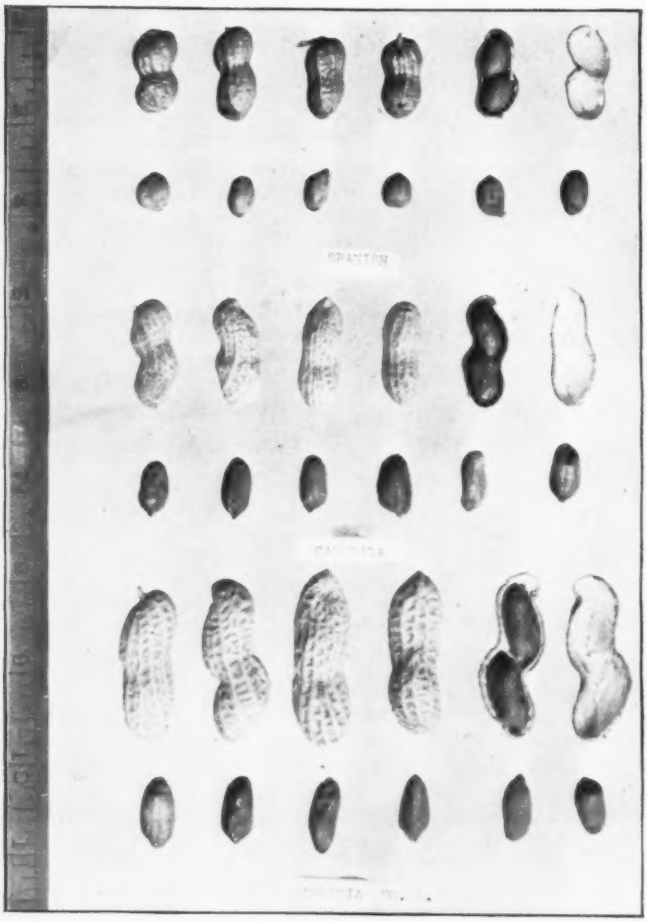
It is clearly recognized that there may be a great variation in the importance of the kinds of knowledge increased. The writer has an acquaintance who is said to have written an extremely able thesis on the "Doorknobs of Pompeii." It is also true that many of the methods which have been employed to increase knowledge have failed to increase it, in some cases but by no means in all cases, due to the inability of the investigator to comprehend the essential elements of scientific research. It is, also, true that the sources of error surrounding many forms of investigation may be so great or the number of years required to establish the facts may be so great as to make such effort inadvisable. It is also true that many experiments have been conducted without a clear understanding of the results which it was sought to obtain. It is also true that one may seek to observe and record phenomena or he may seek the reasons for the observed phenomena. He may seek facts or he may seek principles. He should seek both. Further, it is not safe to enunciate principles without a knowledge of the observed facts. * * * * The best way to determine the correctness of new principles which some enthusiastic investigator with an ambition to make a "scoop" launches half baked upon a hungry public is to consider quietly whether it explains the known facts in the field in which this principle is supposed to operate. If it does not, it should receive further investigation, and this further investigation will be quite as important and may be quite as original as the first or "original" investigation. A farmers' institute lecturer who is fond of alliteration was wont to say: "When the chemist and cow disagree, you'd better stick to the cow." For practical purposes this is undoubtedly the safe procedure, but from a scientific point of view, if the chemist and the cow disagree it is best to suspend judgment until they do agree.

THE PEANUT AS AN AGRICULTURAL CROP

By L. C. Corbett

Bureau of Plant Industry, United States Department of Agriculture

THE early history of the peanut in America is somewhat mysterious. Tradition says that it was introduced in early days in connection with the slave trade. While the plant is native to the new world, it was early introduced into Africa where it seemed to gain a foothold quickly, and during the traffic which existed in early Colonial days between this country and Africa the peanut was undoubtedly brought into Virginia and the Carolinas either as a food by the Africans or by some of the ship captains. That the peanuts early grown in the United States came from Africa led to confusion regarding the origin of this plant; but DeCandolle, who is our best authority on the origin of cultivated plants, unravelled the mystery and settled the question once and for all by stating



TYPES OF PEANUT GROWN IN THE UNITED STATES

that the peanut, although extensively cultivated in Africa and India, was of South American origin. Six or seven other closely allied species of Arachis are found in South America, and it would be contrary to the laws of nature to find the common peanut an exception to the rule and a native of other territory than that of South America. The present cultivation of the peanut for commercial purposes is chiefly confined to areas in Virginia and the Carolinas, although the territory extending from the southern end of New Jersey along the Atlantic and Gulf Coasts to and along the Rio Grande River in Texas, could profitably be devoted to the cultivation of peanuts for agricultural purposes. This area is one in which the seasons free from frost are comparatively long, and much of it has a soil carrying a large percentage of sand or of alluvial matter, making it easily cultivated and well adapted to the peculiar habits of the peanut plant.

Botanically the peanut belongs to the same group of plants as do the peas and beans, but its chief peculiarity is that it bears its fruit or nuts under ground rather than above ground as do most other leguminous plants.

For a long time the peculiar habit of fruiting made the plant a puzzle as regards its botanical structure. Although it was supposed to have two types of flowers, staminate flowers borne above ground with showy petals, and perfect flowers borne close to or beneath the ground and called cleistogamous flowers, careful study has revealed that this is not the case; the plant bears one type of flower only, which is perfect, with a very long tube, and which after fertilization takes place, withers and falls away. The stem of the peanut rapidly elongates and thrusts its point into the soil, the point really being the ovary of the flower, and after it has penetrated the surface of the soil the ovary develops and the peanut is formed. With the bush type of plants it will be noted that the nuts are borne in a dense mass or cluster about the base of the stems; while with the vine or running type of peanuts the nuts are borne not only close to the root but at some distance along the branches as well.

The preparation of the soil for peanuts should begin with a preparatory crop, preferably leguminous, which has been treated as a hoe crop, that is, kept clean by cultivation. If a leguminous crop for green manure cannot be used, a clover sod or a corn stubble will suffice. The clean culture of the crop preceding the peanuts makes the cost of caring for the peanuts themselves much less than is the case upon land badly infested by weedy plants. If the soil is overgrown by weeds or is in sod, it should be plowed the fall previous to planting in the spring. If it is stubble land, fairly clean, plowing should be deferred until spring. The plowing should be moderately deep but should not bring up soil which has not previously been under the plow. If the soil is light and sandy in nature and contains a considerable percentage of organic matter, it is benefited by an application of lime at the rate of from 12 to 20 bushels to the acre, or of gypsum at the rate of 500 to 800 pounds to the acre. Peanuts are decidedly benefitted by soils which are not acid. After the plowing has been completed the preparation of the seedbed should be carried on by the use of soil-stirring implements which do not reverse the soil as does the plow. The Acme, cutaway and disk harrows could all be used to advantage for this purpose.

Fertilizers for peanuts are of a general nature but must be handled in a particular way. If barnyard manure is employed, it should be thoroughly composted and preferably applied to the crop preceding the peanut crop. If this is not the case, it should be applied in the fall and plowed under with the stubble or sod land. The use of commercial fertilizers with peanuts is very similar to its use with potatoes. For best results it is considered advantageous to apply part beneath, and part over the seed. That which is applied before the seed is planted is placed in the soil by making a furrow along the line to be occupied by the plants, scattering the fertilizer in it, furrow and incorporating it with the soil by running a cultivator over the line of the row. Next follows the planter, and in covering the seed a portion of the application of fertilizer is then distributed. The same general rules in regard to the use of nitrogen, phosphoric acid, and potash that hold with other plants are found to be true with peanuts. The nitrates have a tendency to stimulate the development of vine at the expense of the nuts, sometimes producing an undue number of "pops" or false nuts. This is particularly true of fresh stable manure applied in the spring. The phosphates have a tendency to slightly increase the fruitfulness of the plants, while potash is considered the most valuable factor in the fertilizer for peanuts. It has a tendency to increase fruitfulness and hasten maturity, both of which are desirable qualities.

Seed selection with peanuts as with all other agricultural crops is the keynote of success. The planting of indifferent seed results in an indifferent harvest, but those who carefully select

HARVESTING
Showing stacks of vines in background

seed from the most productive plants are amply rewarded for their care and attention. The work being done by those promoting the peanut industry of the South, notably the editors of the Nut Journal, should be commended. It is not too much to say that within a few years carefully selected seed will increase the yield by 20 to 50 per cent. Good seed produces a more even stand of plants, which in itself returns a greater yield per acre ; but a more uniform stand of exceedingly productive plants still further increases the yield per acre, and this is what can be expected from high-grade seed. This is what has been accomplished in the selection of seed corn. Many millions of bushels have been added to the crop of the country simply through the selection and improvement of strains of corn and what has been done with corn is possible with the peanut.

The planting of the seed is an important step in the production of the peanut crop, for upon the methods employed in planting depends to a very large extent the stand of plants obtained in the field. If the seed is planted in the pod and adverse climatic conditions follow the planting, a very poor stand of plants is apt to follow, while if the seed is hulled and only the kernels planted, a much more uniform stand will ordinarily result. With the Spanish nuts, however, this difference is not so marked as with the thicker-shelled and larger-growing varieties. For agricultural purposes I doubt if it will ever be advantageous to shell the nuts for planting, particularly as the Spanish nut will be the foundation of the peanut industry from an agricultural standpoint. But if the shells of the nuts are slightly cracked so as to admit moisture to the kernel quickly after placing the nut in the ground, almost as good results are obtained as when the nut is shelled. If some device could be designed which would crack the shell without splitting the kernel, it would be a decided advantage in most planting operations. In fact, at the present time many planters obtain their seed from the factories instead of saving it from their own plantations, because they can obtain shelled nuts which are satisfactory for planting purposes

from the factory. This practice, however, has a tendency to discourage the selection and improvement of the crop, for the factories are not careful in selecting especially fine seed for distribution. A grower depending upon seed obtained from the factory is taking his chances and is quite as apt to get a poor as a good strain.

In planting it is customary to drill the Spanish nuts 24 to 30 inches apart dropping the nuts 8 or 10 inches apart in the row. The bunch type is usually planted in rows 28 to 32 inches apart and the nuts 10 to 12 inches apart in the row. For the running varieties the rows should be 30 to 40 inches apart and the hills 12 to 16 inches apart. The distance used for planting is somewhat dependent upon the previous condition of the soil. If it is somewhat grassy or weedy, wider distances are needed than where the ground is thoroughly clean and in a high state of cultivation.

The manner of harvesting peanuts as an agricultural crop will depend entirely upon the use to be made of the nuts. If they are grown for commercial purposes and are to be sold upon the market, it will be necessary that the vines be lifted and the nuts cared for in the fashion ordinarily practiced throughout Virginia and the Carolinas of placing the vines in narrow, tall ricks or stacks, usually built about a central pole six or seven feet in length, which has been thrust firmly in the ground and provided with some arrangement at the base to keep the vines from direct contact with the soil. If, however, the crop is to be used for forage for cattle the vines can be dug and thrown into small heaps to cure and then handled in precisely the same manner as hay. If they are to be used for fattening hogs, the most advantageous method to the farmer is to allow the hogs to gather the nuts themselves. Experiments at the Arkansas Experiment Station show that upon equal areas the pork production for peanuts is about three times as great as for corn, which is the great hog food of the west. When the vines are lifted prior to having been touched by frost and placed in the stacks above spoken of, they are allowed to remain in these stacks until the cool weather of early winter has arrived, when they are either carried to sheds where picking is done by hand, or are carried to the machine for separation.

During the last few years machinery has been adapted to the planting, harvesting, and threshing of the nuts, so that the hand labor heretofore connected with the cultivation of this crop, which was thought to be a great hindrance to its extensive use, has been largely overcome. There are now upon the market planters adapted to distributing either the whole or shelled nuts; harvesting machinery which will aid in lifting the plants from the ground; and picking devices which practically take the place of the laborious operation of separating the nuts from the vines by hand.

The peanut as a forage crop is not fully appreciated by those carrying on cattle raising or hog farming in the territory to which this crop is adapted. The value of the peanut for forage purposes is greater than that of any other agricultural crop grown in America, The percentage composition of the plant, including the top and whole nuts is greater than alfalfa. The nuts, when used as meal, produce a concentrate carrying a higher percentage of fat and protein than cotton-seed or linseed meal; and the hay, when merely the tops are cut and cured, is equal in value to good clover hay. It is therefore possible in growing peanuts for market to gather a hay crop equal in value and in yield per acre to good clover hay; to secure from the nuts a meal which is superior to cotton seed or linseed meal, and when the nuts and vines are used together to produce a food which is almost a perfectly balanced food for the dairy cow. It is a crop that has been known under favorable conditions to produce from 100 to 120 bushels of nuts to the acre and from one to three tons of forage. It takes the combined products of alfalfa and of the cotton plant to equal in food value the products of the peanut alone.

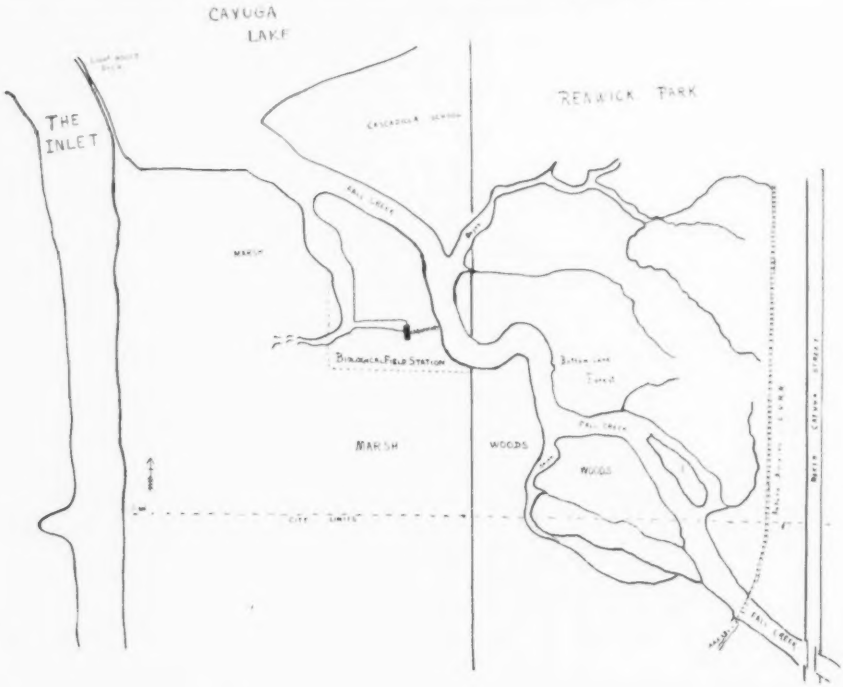
THE NEW WORK IN LIMNOLOGY AT CORNELL UNIVERSITY

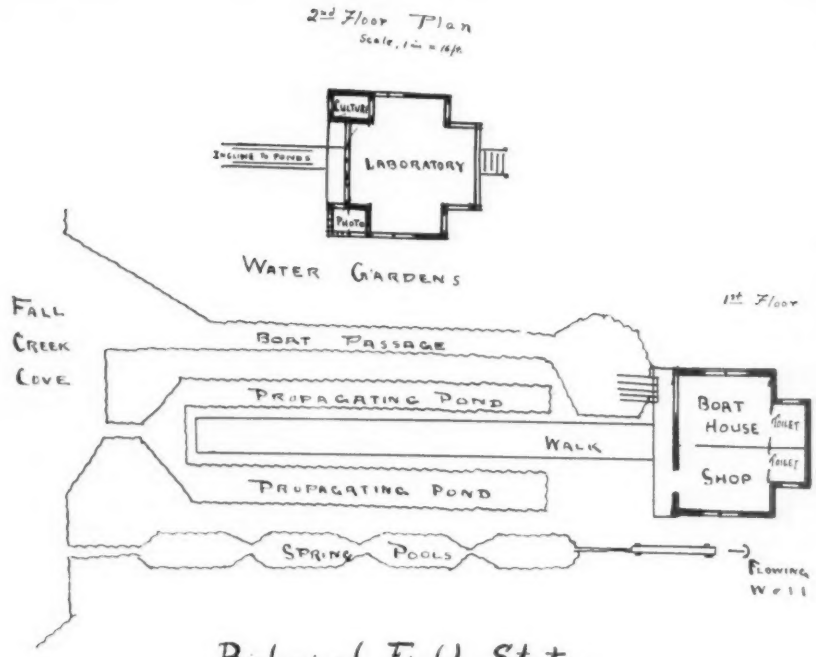
By James G. Needham

Assistant Professor of Limnology

OUT in the broad marsh on the west bank of Fall Creek near its junction with Cayuga Lake stands a little green building, at present entirely surrounded by water, which shelters the newest scientific work undertaken at Cornell University. It is the biological field station that has been built expressly for the investigations in limnology, now beginning. The adjoining shores of creek and cove are well known to Ithaca fishermen, but few other persons enter its wet and mosquito infested environment. After the rosy dreams of Ithaca as the port of the anthracite coal region have well nigh vanished from memory, and along with them many a scheme that was to have extended Ithaca to the Cayuga shore, the musk-rat and the bittern are still in possession of a square mile of flats, set squarely between the city and the lake. This marsh land is at times dry enough for tillage, and at other times wholly submerged. It yields of its soil-riches, twenty tons per acre of worthless sedges and cattails, of spatterdock and pickerel weed every year without fail: and in these respects it is quite typical of a hundred million other acres that are scattered about within the territory of the United States. Here it is a barrier between the city and the lake, in bad mosquito seasons a menace to public health, and at all times an economic waste, "yielding no crop but beauty."

The station was carefully located for the purpose of studying marsh problems, materials for which will be unlimited in quantity and ever acces-





Biological Field Station.

sible. Its establishment was made possible by the support and coöperation of three broad minded and public spirited men; Mr. Delavan Smith, of Indianapolis, who, out of his interest in the public welfare, is furnishing support for the investigations in limnology; Mr. Jared T. Newman ('75) who, for the sake of promoting the study of one of Ithaca's perennial problems, donated five acres of marsh land for a site; and Dean Bailey, who gave the building. Of course Dean Bailey saw that the wet land is a part of the land, and that under the water is other land; and that in both places there are abundant undeveloped agricultural resources.

The accompanying map shows the location of the Station, and the diagram shows its plan. The top floor is the laboratory set high up for better air and greater freedom from mosquitos. A dark room, an outside aquarium and a culture room are integral parts of the laboratory. The lower floor is divided into a boat house, a shop and two toilet rooms. Back of the building are propagating ponds and spring pools fed by a flowing well 150 feet deep.

The propagating ponds of the station are now in use. Here the visitor will find "something doing," and that something is the study of the biology of the more common herbivorous, aquatic invertebrate animals—very elementary work, but very fundamental, and work that has yet to be done somewhere. In our spring pools, other work, such as hatching experiments, and studies of life histories, is in progress. The name "Water Gardens" on our diagram indicates what it is hoped may be developed there. They do not yet exist; for what gardening is possible so long as we are without tools, without methods, and alas, even without knowledge of what is herb and what is weed in the water, and how either of them is propagated!

How bountiful nature is toward the marshes! What an astonishing quan-

tity and variety of both plant and animal life every acre produces! We have been too long content with saying, "What a pity that so little of it is of any value to us." Yet how much of the product of the wild hill slope is of any value to us? If we have found a good use for the hill slope and none for the pond, it is our own fault and not Nature's.

It is the temporary pools, and not the fish-inhabited waters that make the marshes unwholesome; and if we knew the management of the life of these permanent waters as well even as we know that of the land, instead of draining everything and destroying a whole beautiful fauna and flora at one fell swoop, we might be making the water areas of the marshes deeper, more manageable and more permanent, and their land areas drier, and converting them into landscape gardens. It is high time, ere the swelling tide of enthusiasm for drainage has turned all our swamps into cabbage patches, that we had learned more of their present latent possibilities. For it is more than possible that we might find a better use for them. Knowledge is the thing needed. We might be able, if we had knowledge, to retain something of the aesthetic pleasure that their beauty and their interesting life now affords, and something of the pleasant recreations they make possible. And something of civic betterment might be expected to flow from using them to diversify the permanent occupations of men.

A SUGGESTION FOR THE FARM

By A. G. Ruggles, '01

Assistant Entomologist, Minnesota Experiment Station

"I AM enclosing a print of my fireplace made a few days ago. It might be used to show one of the methods of making use of the stones on the farm. I built the house last summer, and this I consider the best feature. At any rate, it is the one I enjoy most. You can readily imagine one comfortably seated before a roaring fire, munching apples and dreaming of the dear, by-gone Cornell days. The stiff unframed picture on the mantle brings it all back."

In this day of cement construction it is perhaps useless to suggest any new method of disposing of the stones on the farm. The old way of digging a hole, dumping in the stones, and covering with earth, although the best that can yet be done under some circumstances, reminds one of the story of the Irishman and the negro. Pat had just set a fence post, and was pondering on how to dispose of the pile of stones and dirt left over. The negro happening along, Pat asked his advice, "Why, suh," said he, "why don't you dig another hole?"

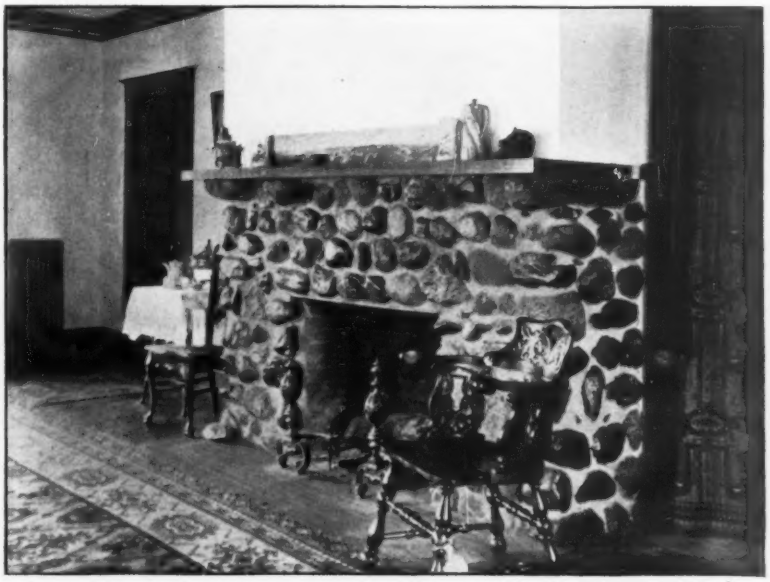
A young farmer just starting housekeeping for himself, and intending to build, will get more solid comfort out of a well built fireplace, than from any piece of furniture he can put into the house. In the cold winter evenings there can be nothing more satisfying than to sit before a roaring fireplace, while the winds howl plaintively outside. Here, too, many a knotty problem on the coming season's work can be pondered over and solved. Then again, if he is in a reminiscent mood, think how stories about the good old college days will be told again.

The young man of a mechanical turn of mind, can make a fireplace such as shown in the accompanying figure in his spare moments. These stones are all laid in cement. The only necessary requirement being a good foundation. The opening should be lined with fire-proof brick, as heat will cause ordinary stones to split and break. Lay the brick the narrow side toward the fire, otherwise if the mortar between should happen to get loose, the bricks would easily fall out. The depth of the fireplace is not an

essential factor. It may be shallow or deep, but the back must slope gradually forward, toward the flue, making at its exit a long, narrow opening. This will insure a good draft, and a non-smokable fireplace.

The cut represents a fireplace in a modern nine-room (twenty-eight by thirty foot) house in a city. It is eight feet long, and two and one-half feet thick, outside measurements. The fire opening is forty-two inches long, thirty-six inches high, and twenty inches deep. It is rather shallow but burns well. In a country home where gravel and stones are plentiful there is no reason why the fireplace should not be made large enough to burn ordinary cord-wood lengths.

Such a fireplace is not only healthful on account of its ventilating properties, and comfortable, but it is aesthetic.



THE ADVANTAGES OF STANDARD BRED POULTRY

By D. J. Lambert

Kingston, R. I.

ALTHOUGH the major part of the breeds, now recognized as Standard, was the result of frequent crosses to bring about the desired type, they are all termed pure bred when they produce more than fifty per cent of males like their sire and the same percentage of females like their dam. I make this distinction as to sexes because in particolored varieties, the combination of colors is not the same on males and females. The older breeds have been improved from time to time, so that in some cases they are quite different from the originals imported from some foreign country years ago.

New breeds are admitted to the Standard of Perfection after they have certain requisites, all of which are included in Article XI of the constitution of the American Poultry Association. Every breed has a type peculiar to itself and the tendency of the times is to get as much distinction as possible between the breeds. Each

breed has one or more varieties, unlike only in color. All of the modern breeds were brought out with a distinct object in view, some to excel in one point, others in other points; with one, the largest amount of meat, with another the greatest number of eggs and with another a combination of flesh and eggs, to fill the middle ground between the first two mentioned. Thus, when we select a standard breed or variety, we can choose one which we know will be suited to our needs, and, if we have preferences as to color or its many variations and styles of markings we can choose that which suits our fancy. Any bird of a standard variety which approaches the ideal is a thing of beauty and all true fanciers may well take pride in showing their flocks to visitors.

The time was when commercial poultry keepers favored crossing the larger breeds with smaller ones to get a better layer and a quicker maturing fowl, but this was before the advent of the Plymouth Rocks, Wyandottes and Rhode Island Reds, all of which were originated to fill this particular purpose and demand. The three above mentioned breeds have rapidly gained in favor and popularity as all purpose fowls while the Leghorns, always reputed as superior layers, still maintain their place.

The practical or utility breeds are most popular because they earn money for their keepers. Only a few can afford to keep hens for fun. A survival of the fittest is continually going on in the poultry world even though man does the culling. The amount of money one can make with poultry depends more on the care than the feed and more on the feed than the breed, yet the latter must be taken into consideration if we desire to keep fowls for any particular purpose. A cross breed or mongrel will not often produce progeny like itself as each successive generation usually reverts to some one of the breeds from which they all came and you cannot know in advance what to expect from them. Keeping mongrel poultry would be going back to old time methods, refusing the improvements of this age and generation, like threshing with a flail, reaping with a sickle, traveling by stage coach and doing such old fashioned things. No progressive poultry keeper will continue to keep anything but pure breeds after giving them a fair trial and finding which are best suited to his needs or which he considers handsomest and most profitable.

THE SÃO PAULO STATE COLLEGE OF AGRICULTURE

THE São Paulo State College of Agriculture of Brazil, of which Professor C. D. Smith has recently been made director, is built on the old plantation of Mr. Luiz de Queiroz, the generous Brazilian coffee planter, who donated his Piracicaba plantation with all its belongings to the State to be utilized for Agricultural education. A school of Agriculture had been organized at this place about fifteen to eighteen years before and two Americans had been employed at different times to direct its affairs, but a lack of adequate funds and buildings, and perhaps a lack of public interest, were serious obstacles to its development. The public-spirited founder and his friends were not disheartened at its failure as a private institution, however, and finally resolved to turn it over to the state, where no difficulty would be found in raising the necessary funds for its support. The college is situated near Piracicaba, a flourishing town of 35,000 inhabitants, distant about six hours by rail from São Paulo, the capital of the State. It stands on the São Paulo plateau, between 1500 and 1800 feet above sea level, in a beautiful undulating country largely devoted to coffee production, whose fertility seems inexhaustible.

The new main building is equipped with a library, chemical and other laboratories, a museum of natura lhistory, a special water supply, electric lights, and all the modern sanitary improvements. Its architectural appearance is unusually pleasing, and its surroundings singularly attractive.

All branches of agriculture are taught and special attention is given to the study of raising domestic and farm animals, an industry which São Paulo is making every effort to develop. Among other special features are manure pits for the preparation of animal fertilizers, stores for cereals, saddlery shops, carpenter shops and blacksmith shop equipped with all necessary materials for horse-shoeing, repairs of machines, implements, harness, etc., and a veterinary section.

Besides the four years' course which leads to the degree of "Agronomo" (expert in agriculture) three other courses are given, an elementary course for plowmen and stable-keepers, an intermediate course for preparation of plantation managers, and an advanced course for preparation of agricultural managers or administrators, industrial managers, professors of agriculture, and functionaries for agronomic purposes. These courses have no fixed duration as it depends upon the students ability. The necessity for the elementary course will be understood when it is recalled that the heavy plantation hoe (*enxada*) was the principal implement for breaking up the soil in the days of slavery, which was abolished only twenty years ago. The *enxada* is still in common use, except on the more advanced plantations, and it is necessary, therefore, to teach boys how to use the plow and other perfected farm implements. The school year is divided into three periods: three months for cultivation, three months for harvesting of crops, and three months for handling of products. The vacation period, June, July and August, which is the cool season of the year, is employed in excursions to the plantations, factories and industrial plants. The faculty is composed of Brazilian and Foreign professors and it is the policy of the college not to admit into the faculty young men of little experience. The Government encourages those students showing exceptional qualifications as to application and ability by giving salaried positions or sending them to foreign universities for graduate work.

EDITOR'S NOTE: On another page is given an account of the work of a Cornell alumnus, Professor C. D. Smith. To those who knew him and have learned with interest of his departure for foreign lands, it was thought that this brief sketch of the college to which he is going, would appeal. And not only this, but also it gives an idea of the growth and appreciation of agricultural education that is arising in progressive republics of South America.

The Cornell Countryman

MAY, 1908

The 1908 Elections

THE board for 1908-9, as nominated and elected in April, is as follows: Editor, E. L. D. Seymour, '09; Alumni Editor, E. L. Baker, '09; Associate Editors, W. Y. Rumsey, '10, F. E. Benedict, Sp. and N. R. Peet, '10; Business Manager, S. F. Willard, Jr., '09; Assistant Managers, R. J. Shepard, '10 and T. Bradlee, '11. The position left vacant on each side of the board is to be filled from the freshman competition, which is running at the present time. This is the first time in the history of the *Countryman* that there has been a re-election of Editor, but the unusual condition mentioned in an earlier number, resulting in the loss of four editors by graduation, and the lack of sufficient competition for the position, may be accepted as direct causes for this policy. This is but one indication of the need of direct and active interest and support by the students, if the benefits of the *Countryman* are to be given to the greatest number, and its existence to be put upon a firm and permanent foundation.

Commissioner Pearson

IF our feeling of exultation at the news of Professor Pearson's appointment to the office of Commissioner of Agriculture, was tempered for a moment, by a sensation of regret, it was not at the thought of the ultimate good that will result, but of the loss which the college will sustain with his withdrawal from the faculty. But in a moment, with the realization that we are not losing his assistance, his influence, and his ability, came the unmodified and sincere appreciation and rejoicing in the honor and reward that has been conferred upon him. For, as State Commissioner, Professor Pearson will, as before, work for progress, for agriculture, and for New York, and his deeds will bring to Cornell the fruits of their success. Therefore we do not bid farewell to the man whom we have known and respected as a teacher and a friend, but simply see him assume an office of greater possibilities and increased importance—a place for which he is eminently fitted and worthy, with a knowiedge that he is still with us in spirit, in coöperation for the good of the farmer; still the same Cornellian and the alumnus of our College of Agriculture. We express our praise for Governor Hughes in his choice; we congratulate the State of New York and its farmers and its college in their acquisition; and we offer to Professor Pearson, with every expression of appreciation and esteem, our thanks for his work in the past, and our heartiest wishes for his success and welfare in his new position of honor and trust.

An Agricultural Innovation

"Of the sixty-five "C's" given at the Junior Smoker, ten came to the College of Agriculture; last June four 'farmers' rowed at Poughkeepsie; the College named among its students the captains of the Varsity football, fencing and wrestling teams; five men of the latter team are of the same college as their captain; and we are going to be represented among the point winners in the Intercollegiates." There are not many colleges of which that could be said, and if the students of this one "stood a little straighter and taller" as Professor Pearson expressed it, when they heard the president of the Agricultural Association run through that list of University honors, no less should they have realized *every* thing that it meant, and how they bear a great and worthy responsibility in maintaining and augmenting that record. But they have evolved a new method through which the enthusiasm and spirit of the college can be directed toward this end, and after an athletic mass-meeting on April 14, the honor of having the first College Athletic Board of Control, may be justly claimed by Agriculture. In this Board and in the idea and system that is behind it, are great and numerous possibilities. It is the duty, then, of the students to aid the board in making its possibilities actual, beneficial realizations. It would be, we hope, redundant repetition, to enumerate the reasons why we should enter into these activities—reasons that involve duty, loyalty, and the advantages of health and development. We have the Athletic Board to bring forward these thoughts; but with an expression of hearty approval at this institution, and with the firmest wishes for its success, we simply ask that the number of teams be large, the number of men on the teams larger still, and the number of candidates, of live, energetic "Cornellian," competitors—be the largest of all—that it include every student of the college who can run, jump, row, play, and who shall bring with him added strength, reputation and honor for his college.

The Graduate School of Agriculture

A month ago a short prospectus of the third session of the Graduate School of Agriculture, was presented in the *Countryman*. This was not so much to advertise the school, in the eyes of the public,—for by those who are interested or concerned its progress has been closely and constantly observed—but rather to explain its object and methods, and suggest the remarkable opportunities it offers. A rapid glance at the partial list of lecturers indicates in a limited way, the inportance of the institution at which will be gathered perhaps the most eminent collection of agricultural scientists that has been known. With the University Summer Session in progress, the State Experiment Station conveniently located at Geneva, and the opportunities of a college such as ours, the month of July holds out to agricultural graduates, and to some extent students in general, inducements that are met with but rarely, either in the years of educational training, or even, we may say, in a lifetime.

Candidates for Degrees

In order that the custom of publishing a picture and write up of each candidate for a degree, may be maintained successfully and completely this year, the *Countryman*

requests that all such material be handed in as soon as possible. This consists of a photograph, a write up of not more than 50 words, and one dollar and a half to pay the cost of insertion and the making of the half tone. All cuts after use in the *Countryman* may become the property of the persons represented if desired. The success of this part of the June issue, and the convenience of its arrangement can be greatly augmented by the prompt response on the part of those concerned, and the *Countryman* urges that all inserts be sent to the editor by May 5th at the latest.

RAYMOND ALLEN PEARSON

By H. E. Ross, '06

BY COURTESY CORNELL DAILY SUN
R. A. PEARSON

RAYMOND Allen Pearson was born at Evansville, Ind., in 1873. He received his preparatory education at the Ithaca High School graduating in 1889. He entered Cornell and graduated from the Agricultural Course in 1894 specializing in Dairy Industry, and received the degree of M. S. A. in 1899.

After graduation Professor Pearson engaged in the milk business in Philadelphia, later giving it up to accept the position of Assistant Chief of the Dairy Division, United States Department of Agriculture. After remaining in this position for seven years he accepted a position as general manager of the Walker Gordon Laboratory Co., and one year later was appointed Professor of Dairy Industry at Cornell University.

On April 15 Governor Hughes nominated Professor Pearson as Commissioner of Agriculture of the State of New York. By virtue of his new position Professor Pearson becomes a member of the board of trustees of Cornell University, a member of the Board of Control of the Geneva Experiment Station and a member of the State Fair Commission.

Only the warmest praise can be spoken of the work which Professor Pearson has done here at Cornell. Possessed of unusual executive ability he has rapidly built up his department until it has become one of the leading departments of the College of Agriculture, and both through College teaching and direct personal effort he has done much to improve and further Dairy interests throughout New York State. The loss of so splendid a teacher and so thorough an organizer will be keenly felt in the College of Agriculture, but the many friends of Professor Pearson congratulate him on the honor of his appointment. It is the feeling of all that the same ability which he has shown at Cornell University will enable Professor Pearson to accomplish much for the farmers of New York and to raise the already high standard of Agriculture of the Empire State.

GENERAL AGRICULTURAL NEWS

A recent issue of the *Transvaal Agricultural Journal* contains an article entitled Agricultural Education in America, which gives an extended account of the New York State College of Agriculture and its work. The article, which is by William MacDonald, Ph.D., is concluded with the following observations on the college:

"Cornell is never still. Her latest educational venture is the Travelling Summer School of Agriculture—the first of its kind in America—consisting of a train made up of a number of students under the care of the Professor of Agronomy. * * * From this imperfect sketch it will be seen that the central thought which underlies all effort in the College of Agriculture of the University of Cornell is service to the farmers of the State. But the remarkable success of the College has been due in no mean measure to the influence of the Director, Professor L. H. Bailey, whose magnetic personality has drawn students from all parts of the world, and farmers from every state in the Union. And, had we time, it would be instructive to pass in review the life of this tireless American from the time he left the Michigan farm till the day he was elected to the Chair of Horticulture, and, later, called to re-organize the College of Agriculture."

* * *

An especially timely bulletin has just been issued from the Missouri Experiment Station by Dean H. J. Waters giving the results of some experiments to determine the value of different forage crops for hogs. Thirty-six pigs weighing about fifty pounds each, were fed in lots on different forage crops in connection with corn until they were ready for market, accurate account being kept of the cost of gains made. In cheapness of grains the feeds used ranked as follows; Corn and skim milk, cheapest; corn and alfalfa, second; corn and red clover, third; corn and bluegrass, fourth; corn and rape, fifth; corn and ship stuff, sixth. A saving of about 75 cents a hundred in the cost gain was effected by using green clover instead of fresh bluegrass. A saving of $1.00 a hundred was effected by using alfalfa instead of bluegrass. When it is realized that alfalfa comes on early and when properly clipped stays green all summer, and until the very hard freezes of early winter, its importance as a hog pasture is apparent. Clover yields more forage per acre than bluegrass, and as shown by these experiments has a much higher feeding value. It is of the utmost importance, therefore, to provide this sort of pasture for hogs rather than to require them to run on a bluegrass pasture, or even worse than bluegrass, a timothy pasture, or even far worse than this, to confine them in a dry lot in the summer time. This bulletin recommends a succession of crops for profitable hog pasture. The bulletin is for free distribution, and may be had by addressing the Experiment Station at Columbia.

* * *

In the March number of *Country Life in America*, Mr. George T. Powell, of Ghent, N. Y., writes on pedigree fruit trees. Eighteen years ago, at a nurserymen's meeting, Mr. Powell made the then unheard of statement that desirable qualities in fruit trees could be secured by selecting buds from trees with a known productive record. Mr. Powell's theory was received with incredulity, but he himself proceeded to act upon it, with the result that many of his trees are now bringing him net returns of $1000 per acre. His Kings are grafted on Northern Spy, which Mr. Powell believes will ensure them against the "collar rot" so destructive to that variety All of his Kings were budded with buds from a single tree grown in Tompkins County, which was so nearly perfect in form, resistant qualities, and the size and quality of its fruit that it attracted wide attention. All Mr. Powell's

trees have inherited the characters of this parent to a greater or less extent. Mr. Powell's article is a splendid demonstration of the fact that it is just as important to select buds from a tree of known qualities, as it is to select the parents from which to rear improved live stock.

* * *

The Second Annual New England Conference on Rural Progress was held at the office of the secretary of the State Board of Agriculture, Boston, March 6. The meeting this year, like that of last year, was a success, and the value of this conference now seems to be fully demonstrated. Delegates were sent from nearly all the important rural associations in New England. The general subject discussed was "Teaching Agriculture in the Public Schools," including elementary agriculture in the grades, secondary agriculture in the high school, separate schools of agriculture and federal aid.

* * *

The annual report of the Connecticut Experiment Station says the gypsy moth has not spread in the state during the past year. The infested area has been pretty well isolated, and within this area all larvæ, pupæ and egg masses have been destroyed as far as possible. Trees to the number of 15,000 have been banded, and 3000 caterpillars destroyed. For the work there was the annual appropriation of $1000, and the State Board of Control could expend $10,000 if necessary.

* * *

The Bureau of Statistics of the Department of Agriculture has issued a statement showing the number and value of the farm animals in the United States, January 1, 1908. There has been, on the whole, an increase in numbers and a decrease in value since the beginning of the previous year. The average prices per head are:—Horses, $93.47; mules, $107.76; milch cows, $30.67; other cattle, $16.89; sheep, $3.88; hogs, $6.55. With the exception of sheep, every kind of animal showed a decrease in the average value per head, though the decrease in the value of horses (10 cents), milch cows (33 cents), and other cattle (31 cents), is so slight as to be inconsiderable. Sheep increased 4 cents a head.

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Professor Charles L. Beach, of the University of Vermont, has been elected president of the Connecticut Agricultural College at Storrs.

* * *

A bill has been introduced into the New York Legislature, providing that the owners of lands devoted exclusively to wood, timber and forest products shall be assessed at a rate no higher than the rate on barren lands; and that on application, the forest, fish and game commissioner shall send a forester to inspect such woodlands and recommend measures to promote the growth of trees.

* * *

The 1909 meeting of the American Carnation Society will be held at Indianapolis, Ind. Marcellus A. Patten, of Tewksbury, Mass., is president, and A. F. J. Baur, of Indianapolis, vice-president for the ensuing year.

* * *

The Crop Reporting Board of the Bureau of Statistics of the Department of Agriculture finds, from the reports of correspondents and agents of the Bureau, that the average condition of winter wheat on April 1st was 91.3 per cent of normal, against 89.9 on April 1st, 1907, and 86 2 the average of the ten years of 1898-1907.

* * *

The Department of Agriculture last year examined 1,217 samples of red clover seed, and found seed of dodder in 405, yellow trefoil seed in 424, and that 135 originated in Chili. Of 399 samples of alfalfa seed secured, 191 contained seed of dodder, 135 yellow trefoil seed, 120 sweet clover seed, and

16 bur clover seed. Of 420 samples of Kentucky bluegrass seed obtained, only eight were found to be free from any trace of Canada bluegrass, and in 110 samples, Canada bluegrass seed was found in quantities exceeding five per cent, 32 of these being Canada blue grass seed. The law authorizes the Secretary of Agriculture to make these investigations and to publish the results, together with the names of the persons by whom the seeds are offered for sale, and this publication will be made in Circular No. 26.

CAMPUS NOTES

At the meeting of the Agricultural Association on April 14, besides electing the *Countryman* Board for 1908-09, an amendment to the consitution providing for an Athletic Board of Control was proposed and adopted. This board is to consist of a general athletic director (student), a student and a faculty member and the captains and managers of all the Agricultural College teams and crews. H. C. Young, '10 was elected general athletic director; E. Earle, Jr., '08, student member and Professor Pearson, faculty member of the board. The duty of this board is primarily to promote athletics in the Agriculture College; it will also award shingles and in general, control the various branches of athletics in our college.

The meeting was then turned into a general mass meeting for the purpose of arousing enthusiasm in track and baseball. Coach Moakley spoke first, telling us something of the history of athletics in the Agriculture College; he showed us the remarkable advance we have made in the past and gave us some good suggestions for the future.

N. R. Peet, '10, captain of the Agricultural track team and G. H. Miller, '09, captain of the Agricultural baseball team spoke, each telling about the plans of the spring season and urging candidates to come out. Professor C. H. Tuck, '06, then spoke and besides urging the fellows to get out and "play," told us the plans for the Spring Picnic of Tompkins County schools to be held here the latter part of May.

Professor Pearson gave us an inspiring talk as usual and also urged the men to get out for something. The Glee and Mandolin Clubs furnished music from time to time and at several intervals, the candidates for cheer leader were given a chance to prove their worth. On the whole, the meeting was very successful in its purpose of starting enthusiasm in intercollege sports.

* * *

Saturday evening, March 14, the Poultry Association elected officers for the ensuing year as follows:—President, T. F. Boyle; Vice-President, Miss Vida French; Secretary and Treasurer, F. E. Benedict; Assistant Secretary and Treasurer, W. O. Strong. These officers with R. L. Williams constitute the board of directors. Three other members of the board will be elected or appointed next fall and winter, of whom at least one member shall be from the Short Course class.

* * *

One of the most enjoyable Assemblies of the year was held in the auditorium of the Agricultural College on Thursday evening, April ninth. The program consisted of the usual interesting talk by Dean Bailey, who, during his talk, read a selection entitled "The Devil in the Belfry," being reminded of this by seeing a number of fellows passing their whole evening doing nothing but smoking. The Glee and Mandolin Clubs rendered a number of selections which were well received.

After this part of the program the following ladies entertained in the Domestic Economy Department serving hot maple syrup, sandwiches and pickles; Mesdames Warren, Whetzel and VanAuken and Misses Rose, VanRenssalear and McCloskey. They were assisted by the Girls' Club of the Agricultural College and a committee of men students.

The annual picnic of the students in the rural schools of Tompkins County will be held at the Agricultural College sometime during the latter part of May. Previous to this a congress of school teachers of the county will be held here to discuss the subject of agriculture in country schools and to arrange for a suitable program of sports for the picnic, such as basketball, baseball, paper chases, etc., between the different schools attending.

* * *

The captains and managers of the various college baseball teams are arranging a schedule for the inter-college series, the first games to be played about April 15th. A cup, presented by the faculty, will be awarded to the winning college.

* * *

An interesting experiment is to be made in the Poultry Department under the direction of Professor S. H. Gage, of the Embryology Department in the Medical College, and C. A. Rogers, M.S.A., and A. E. Boicourt of the Poultry Department.

The experiment is with the use of Soudan III as a coloring matter of the fat deposits in hens and hens' eggs. The object is to determine how long a time is required by the small yolk of the egg to develop to the size found in the egg, and to learn whether the growth of the yolk is uniform or more rapid during the later stages of development. The experiment will also determine whether Soudan III will color all the fat in the body and in the yolk or only that fat which is being deposited while the stain is contained in the blood; and finally, does the coloring which is given to the fat in the eggs pass into and color the fat in the body of the chick hatched from these eggs.

Hens to be used in the experiment are to be fed the regular ration as before, but in addition some will be given three doses of the reagent on three successive days, others will be given one dose each fourth day, others will be given a dose daily and the remainder will receive none. All will be killed at the end of the experiment to find the effect of the staining on the fat.

* * *

The silver cup won by the cross country team of the Agricultural College in the race last fall has been placed in a case in the hall of the main building near the west door leading into the auditorium. This cup is held by the winning college for one year.

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The proceedings of the American Pomological Society for the 1907 session are now in press. The work was compiled by the secretary and assistant secretary, Professors Craig and Judson.

* * *

The Horticultural Department has recently received a number of cases in which will be displayed the smaller kinds of tools used in horticulture, such as pruning knives, garden tools, spray nozzles, etc.

* * *

A letter was recently received by the Horticultural Department from Professor John Craig, dated March 20th, Glion, Switzerland, in which he stated that he was rapidly recovering his strength after his serious illness. He wrote in glowing terms of the Swiss scenery. Professor Craig expected to leave for Italy about the middle of April.

* * *

The American Society of Agronomy will meet in Ithaca during the session of the Summer School of Agriculture.

* * *

The annual report of the secretary-treasurer of the Cornell Poultry Association shows the receipts to be $674.74 and the expenditures $674.01. The net assets of the Association are $42.51.

J. Taubenhaus, '08, has started a study of hollyhock rust and its control under the direction of Professor Whetzel of the Plant Pathology Department. The seed of one hundred and fifty varieties was furnished by leading seedsmen of the United States, Italy, Germany and France. They will be set out on about three-quarters of an acre of land.

The chief problem will be the testing of varieties for resistance to disease and the testing of colorless fungicides. Dr. H. J. Webber will work on the breeding of resistant varieties and members of the Horticultural Department will study varieties from the florists' viewpoint.

* * *

The Animal Husbandry class, accompanied by Professors Wing and Harper, visited some of the large dairy farms near Syracuse on March 26-27. Other classes in the College are planning excursions also. Messrs. Barber and Thompson are making arrangements for an inspection trip by the class in Market Milk ; the class in Farm Management under Professor Warren intend making two all day excursions, one to McLean and one to farms near Auburn, and Professor Wilson's class in Practical Pomology anticipates a two day trip to the orchards and vineyards at Rochester, Brockport, Hilton and Williamson.

FORMER STUDENTS

'75, M. S. Agr., '73, B. S. Agr.—Clinton DeWitt Smith was one of the earliest graduates of this College and has been a prominent agriculturist and educator since the time of his graduation. He was born at Trumansburg, N. Y., in 1854, and received his preparatory education at the academy of that village. While at Cornell he was prize captain of cadets in 1873. In 1879 he was commandant of the Star Military Institute at New York. In 1880 he was admitted to the bar and practiced law in his native town for a number of years. It was in 1890 that he returned to the

C. D. SMITH

calling in which he had been educated and to his Alma Mater—Cornell, where he became assistant agriculturist. The year following, however, he went to the Arkansas Experiment Station. His advancement now became rapid and he became a leader in things agricultural. He was Director of the Experiment Station and Professor of Dairy Industry at the University of Minnesota from 1891 to 1893. In 1893 he was called from Minnesota to the directorship of the Michigan Experiment Station and a professorship in the College of Agriculture, where he has been Dean of the special courses since 1900. He originated the special courses and built the dairy buildings, both at the University of Minnesota and at the Michigan Agricultural College. Professor Smith has many times been honored for his excellent work. He was appointed Dean of the College of Agriculture at the University of Illinois in 1897, and elected president of the New Mexico Agricultural College in 1902. The American Academy of Science honors him as a member and the Michigan Dairy Association as a charter member. He is also a member of the Alpha Zeta Fraternity. As

the author of a number of agricultural bulletins, and a member of the editorial staff of the Country Gentleman and Cultivator, Professor Smith is also widely known. He has recently accepted an appointment as Dean of the new College of Agriculture at San Paulo, Brazil, and left early in April for his new field of work.

'06, A. B.—Chas. A. Spooner who, while not registered in Agriculture while here, took a large part of his work with Professor Comstock in Entomology, has resigned his position as Entomologist at the New Hampshire Agricultural College. Last month he spent a few days at Cornell visiting old friends. We were glad to see "Charlie" again.

'06, B. S. A.—M. W. Evans spent a day at the College, on his way from Washington, D. C., to Pullman, Washington State, where he is conducting experiments and research work for the Bureau of Agrostology of the Department of Agriculture.

'07, B. S. A.—Miss V. R. French has returned to Cornell and is now taking graduate work in the College.

'07, B. S. A.—We were in error last month, in stating that Lyman F. Ayers was Professor at Hampton Institute, Va. We have since learned that he is an Instructor of Animal Husbandry.

For the third time the Fletcher Club, General Agricultural Class of '05, met at Cornell, and the fellows who were there, Mekeel, Prole, Sisson, Snow, Helfer, Faulkner, Booth, Phillips, Fowler, Brooks and Harriman had an interesting hour talking over business of the club, old times, their efforts in farming and the results of the last season. They earnestly hope that there will be more at the next meeting to be held at the State Fair.

At the reunion of the Winter Poultry Class, '06, which was known as the "James E. Rice, Junior, Club," in honor of the arrival of the young man who gladdened the home of Professor Rice during that winter, the following toast was given by Dr. E. M. Santee, W. D. '06, at the request of chairman H. H. Harriman:—"To Jimmy Junior. May he live long and follow in the footsteps of his illustrious dad whose work for the Poultry Department has been and is a source of pride to every man who loves old Cornell." Refreshments were served, the old jolly take offs on certain members were sung, reminiscences entered into, and an exceedingly pleasant evening spent, after which the meeting adjourned for one year.

Those present were Professor and Mrs. Rice and friends, Dr, Santee, Mr. and Mrs. Somers, Miss Joslin and Messrs. Boicourt, Joslin, Boyle, Freeman, White and Harriman.

'02, W.—Colon E. Nichols, who spent three winters here in the short courses, has been managing the farms of Mr. Brisbane, one of W. R. Hearst's editors, at Farmingdale, N. J., during the past year. Recently he resigned his position to take charge of his father's fruit farm at Lewiston, N. Y.

'03, W.—D. D. Gordon is engaged in farming at Rushford, N. Y. The most of his attention is devoted to fruit raising, with which he is very successful. He is very much interested in the grange of his town and his activity is helping to make it a prosperous one.

'05, W. D.—W. L. D. Caldwell is with the Beaker Dairy Company of East Freetown, N. Y., where for nearly six years he has had charge of their creamery. A recent increase of 25 per cent in his salary is an indication of his success as manager.

'08, W. P.—W. G. Lippincott has been appointed superintendent of the Poultry Plant of the State College, Ames, Iowa.

'06, W. P.—E. O. Lansing has established at Romulus, New York, a Leghorn Plant with a capacity of 1,500 fowls. He has been unusually successful with these.

'06, W. P.—C. W. Joslin has perhaps been as successful in the same business as Mr. Lansing. He also conducts a general farm.

'07, W.—Louis W. Coffin writes us that he has strayed from the farm and is getting experience in creamery work at the milk station at Jamestown, N. Y. He expects to return to Cornell next winter for the Dairy Course.

'08, W. D.—A. G. Fletcher, who will be remembered as President of the dairy class and one of the most active of the winter course men, has, since leaving Cornell, been Superintendent on the Wilder farm at Gardner, Mass. Mr. Wilder has some 400 acres devoted to general farming, and Mr. Fletcher is getting ample opportunity to practice the principles assimilated here.

BOOK REVIEWS

The A B C and X Y Z of Bee Culture. By A. I. and E. R. Root. 5x8 inches. 536 pages. Illustrated. Published by the A. I. Root Co., Medina, Ohio. Price $1.50.

As its title suggests this book is a cyclopedia of everything connected with bee-culture. The different varieties of bees, the honey, the hives, and all implements used in caring for bees are carefully described and their use fully explained. Various methods of procedure are discussed and instructions are explicitly stated so that beginners may easily understand them; yet, at the same time, are technical enough to satisfy the most experienced bee-keeper. Throughout the book are cuts and half-tone photographs which amplify and illustrate the topics under discussion. There is a supplement composed of photographs of bee-exhibits and apiaries which is very instructive and helpful.

A B C and X Y Z of Bee Culture is without doubt the best authority on such matters that has been printed. The book is full of valuable information obtained from thousands of people who have had long experience in apiculture, together with the results of the authors who have for years been practical men in this line. The book is worth several times the price to everyone interested in bees.